

COMMON MYTHS REGARDING THE FALL OF ICE FROM THE SKY

By Bimal Kumar Srivastava

Former General Manager, Airports authority of India, Aviation Consultant & Director, Aero Survey Pvt Ltd., G-11, Second Floor, Green Park Extn., New Delhi-110016 (INDIA)

Abstract- Reports about bizarre incident of fall of a lump of Ice (Blue, Greenish, white or of any other colour) from sky even when the weather might have been dry keep on appearing through the media all around the world mentioning. Mostly such ice is not related to weather, but is a mixture of human bio-waste and liquid disinfectant that freezes at high altitude and is known as "Blue ice" or "Aircraft Ice".

There are many myths associated with the blocks of ice fallen from sky. The very first myth is that if the colour of ice from aircraft toilets, must invariably be Blue or Green, which is not true. It could be of any other colour.

The ice block from aircraft and another from the sky and the Megacryometeor are not the same. This is not true. While ice from aircraft is a non-meteorological as such ice get created from the defective pipelines of aircraft toilets; the Megacryometeor is meteorological event, formed under unusual atmospheric conditions.

Another myth prevalent is non availability of aircraft in the sky after the ice fall. By the time the eye-witness looks at the sky, aircraft may fly to as much as 6 to 10 Kms away. Ice from aircraft would melt during fall is not always correct. Heavy blocks of ice from a leaking toilet drain may not totally melt away after the fall.

Key Words: Blue Ice, Aircraft Ice, Aircraft Toilets, Non-Meteorological Ice, Ice from Sky, Leakage from toilet drains, Megacryometeors.

1. Introduction:

Reports of cases of ice fall from the sky even when the weather is dry keep on appearing in Newspapers, TV, and other media channels from all over the world. Such incidents create a lot of furor, confusion, commotion and panic in the surroundings. Media report brings out various versions of the causes of the ice fall as explained by eyewitnesses, and too many theories start appearing around speculating the origin of ice, occasionally of amusing nature. While some people rightly guess it as being from aircraft, others think that the mysterious object could have been a particular type of 'Hail Stone', some relate it to space with astronomical origins. Many others call it a megacryometeor, some compare it as an accidental fall of a box of ice, and various other similar theories. Many people try to touch it and sometimes even taste

it thinking that it was some of the kind of heavenly ice-cream.

The size, shape, colour, weight and nature of ice varies considerably on case to case basis. While in some cases the ice chunk may be very large weighing as much as 25 to 50 Kgs or even larger reaching more than 100 Kgs, at other times it may be a small piece of ice. Sometimes its colour may be pure white or transparent and in other cases, it may be blue, green, yellow, ash-coloured or rusty or of any other colour.

Unfortunately, after some time, the news becomes old, the excitement fades out and people forget about the whole episode. And then there may be occasions, when after some time, there may be another case of ice fall and then the process repeats.

It is however certain that such cases are likely to endanger the lives and properties on the ground. God forbid, someday or another such incident may create havoc including danger to life & property or occasionally may even lead to a catastrophe. Thus, there is a definite need for a possible solution to avoid or at least minimise such an undesirable occurrence. Accordingly, certain safety precautions in the direction of preventing these incidents would be a great help.

Just to give some examples of such cases.

On 25 March 2015, a resident of Taylorsville, Utah (USA) reported hearing a huge crashing noise, which sounded like a major car accident. He discovered that the windshield of his expensive car was damaged by a huge chunk of ice falling from the sky. He claimed that the ice had fallen from a passing aeroplane at 01:34 am and stated that the falling ice piece missed going through his roof by only inches and if he had stayed in the car that piece of ice would have gone right through his chest. (Ref: <http://www.dailymail.co.uk/news/article-3044035/Utah-man-says-ice-chunk-fell-airplane-smashing-windshield-parked-car.html#ixzz4A0v44DBC>).

On 07 Feb 2018 at around 09:00 hrs, Serhiy Mysekhov, was cleaning the street in Kew Gardens in London, which happens to lie in the flight path to Heathrow Airport. And suddenly to his horror a huge sheet of ice weighing about 20 Kgs crashed dangerously close to him, narrowly missing him by inches leaving Serhiy and other onlookers completely shocked.

A Taxi Driver, Amir Khan captured the heart-stopping moment of Mr Mysekhov cheating death on his vehicle's security camera, which gave the frame to frame historical views of the occurrence. Video Footage started with Serhiy bending down to pick litter from the ground before he gets up to scout the other areas of the pavement. He appeared to see something on the ground and tried to scrape it with his foot as the ice block smashed into the ground making a loud "explosion" of sound - causing him to jump in horror. Apparently, the ice block had come from a passenger aircraft which was approaching to land at Heathrow.

In another case on 17 Dec 2015 at around 13:00 Hrs afternoon a case of fall of ice resulting into personal injury occurred in Amakhoh Village (District Sagar, Madhya Pradesh, India, Geographical Coordinates 23°14'03.39"N, 78°53'06.08"E). On that particular day, the weather was dry with bright Sun and then all of a sudden a huge ice ball estimated to be of 50 Kgs of weight fell over the roof of a house, and then over the shoulder of a 60-Years old lady, who was cleaning utensils just outside her house. The lady received injury on her shoulders and was hospitalized in a Government Hospital. She was lucky enough to survive since the Chunk of ice first crashed into the edge of a terrace of a house before hitting her.

In India, Madhya Pradesh human rights commission (MPHRC) issued a notice to the State government seeking a report on an unusual incident leading to the injury to a tribal woman. (Ref: <http://timesofindia.indiatimes.com/city/bhopal/Aircraft-poop-drop-in-Madhya-Pradesh-Rights-commission-takes-cognisance/articleshow/50717646.cms>)

In Istria (Croatia) on 22 Sept 2012, a huge chunk of ice fell from the sky. The weight of the ice was estimated by the eyewitnesses to be about 300 to 500 kg and its size was about half a meter X one meter X one meter. The ice block fell just about 10 meters from the nearest house and a couple of meters away from other houses, shocking the residents. Witnesses described hearing a noise similar to a missile crashing (<https://www.sott.net/article/251603-Chunk-of-ice-fell-from-the-the-sky-and-shocked-local-residents>)

In another incident on 21st Sept, 2014 at around at 6 am a Doctor family in Cardiff (UK), reported a large slab of ice mysteriously falling over his house from the sky and breaking the tiles and slates from the roof. The Doctor believed that perhaps 18 inches thick. Insulation over the roof must have saved them (<http://www.express.co.uk/news/uk/514324/It-was-a-lucky-escape-Large-block-ice-mysteriously-falls-the-sky-hits-houseit>)

As per China Business Daily Ankang, on March 22nd, 2015 at about 2 pm a large ice block estimated to be more than 50 kilograms fell down from the sky near Shagou

Village in Shuhe Town, Xunyang County, surprising the villagers. Ms Luo told that she suddenly heard a "hula hula" sound coming from the sky. On looking up she found a white unknown object falling quickly towards the southeast of the house with very smooth surface scattered all over the ground. The ice smelled of diesel and licking up, its taste was found bitter. She picked up a few pieces and took them home, put them in the courtyard dam, and soon the ice was melted. [<https://xw.qq.com/news/20150324004912/NEW2015032400491200>]

In that manner, there have been numerous cases, where cases of ice fall from the sky have been reported. Such phenomena have already attracted the notice of Scientists as well as from aviation authorities from all over the World.

Now, let us see was to what could be the reasons for Ice Fall? Taking into consideration all aspects of the matter, the possible sources for the fall of ice could be broadly divided into two different parts.

It could be a (i) natural phenomenon or due to meteorological reasons (or weather-related) then (ii) non-natural or non-meteorological phenomenon¹ and (iii) of course, the third one is the Extra-terrestrial Phenomenon.

2. Natural Phenomenon or Meteorological Reasons (Weather-Related)

Large-sized Hails

Hailstorm is a weather-related event and is formed due to presence to Cumulonimbus and other weather-related clouds. Hail is a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into balls of ice. Hail can damage aircraft, homes and cars, and can be deadly to livestock and people.

Megacryometeors:

Megacryometeor¹ are the large atmospheric ice conglomeration which, despite sharing many textural, hydrochemical and isotopic features detected in large hailstones are formed under unusual atmospheric conditions which differ from those of the cumulonimbus clouds scenario (viz clear-sky conditions). Megacryometeors are extreme atmospheric events and have been recorded all over the world with adequate scientific explanation. The term, however, covers various types of the phenomenon of fall of ice from the sky that of due to meteorological reasons under unusual atmospheric conditions.

According to Jesús Martínez-Frías, the Planetary Geologist from Spain, who had coined the Word "Megacryometeor", the substance matter for

Megacryometeor is pure water and that it is a weather-related event, though related to unusual weather.

3. Non-Natural (Non-Meteorological) Reasons

Fall of Ice from the Roof of High-Rise Structures

There have been several cases where ice pieces and ice sheets have fallen from the roof of high-rise structures. In cold countries of Europe, the US, Japan & China etc. endangering the lives of people & property.

Extra-Terrestrial Origin/ Space Related:

It is also believed that sometimes the ice may have some Extra-terrestrial origin such as from comets, asteroids or meteors etc. However, such objects may have a stony appearance and may contain some metallic objects.

Fall of Ice from aircraft Toilets:

However, one of the most common sources of fall of ice from the sky is not at all related to the weather but linked to a passenger aircraft flying high in the sky, and that too from the most unexpected place, from one of its toilets. The ice from the aircraft is formed as a result of leakage of toilet liquid from the defective drain lines of the toilets of a passenger aircraft. Such leakage may also include leakage of potable water, from the aircraft galley and the wash water from the lavatory sinks.

It is mentioned that the Toilet System of modern commercial airliners work on the principle of Vacuum suction, where the waste gets sucked out through Vacuum suction. Unlike the siphons of household toilets, which use the water-based flush system, this is an active vacuum, and these aircraft toilets don't rely on gravity and flow of water. Use of vacuum requires very little water to clean the bowl (Water may be replaced by the blue sanitizing liquid).

The use of vacuum system in aircraft results into reduction of the weight of the aircraft on one hand and the other, it also saves the water, which in turn, again reduces the weight of the aircraft.

Thus, when a vacuum toilet is flushed, the solid waste and a small amount of blue sanitizing liquid are sucked into the tank. The lavatory waste is then stored in a storage tank located inside the aircraft. After landing, the toilet cleaning vehicles are used to remove the waste from the storage tanks.

It may, however, be clarified under no circumstances, it is possible for a pilot to dump a tank while in flight, as there are no controls inside the aircraft for emptying the storage tanks. There is one exterior lever outside the

aircraft and only the ground crew can operate the valve that opens the tank while the plane is on the ground.

Mostly a chemical (Sanitizing/ deodorizing liquid, containing most commonly a chemical called Anotec which is nothing but a disinfectant commonly used in household toilets), dark blue (It could be of some other colour also depending on the type of sanitizing liquid used by the airliner) is mixed with cleaning water inside the aircraft lavatory holding tanks to deodorize the waste and to break down any solids. The blue chemical serves another purpose. In the event of any leakage from the drain pipes, the ground engineers can detect the leakage by observing the presence of blue colour on the exterior of the aircraft and thus, they would be able to repair it due to visual inspection.

In the event of any abnormality or defect in the drain lines, (Such as due to leakage from the toilet drain lines), a small amount of lavatory fluid comes outside and gets condensed due to low outside temperature. It may also be mentioned that the outside air temperature at high altitude may be as low as (-) 30°C to (-) 150°C or even lower. Such low temperatures turn the watery fluid (With sanitizing liquid) into ice and with time more and more ice keeps on accumulating over it. When the ice becomes too heavy it gets detached and falls on the ground. (Normally it happens during descent when the aircraft encounters higher atmospheric temperatures on coming from higher altitude to lower altitude.).

Thus, there are numerous cases of fall from the sky, which are reported from time to time from various corners all around over the world. The ice pieces are of a different kind, colour, sizes and weight. While some may be as small as 2 to 5 Kgs some others may be as heavy as 25 to 50 Kgs or even larger reaching more than 100 Kgs. Some ice pieces may be of blue, green, yellow, rusty or dirty colour, while others may be whitish or transparent colour.

Let us analyse a few cases of ice fall from the sky from India.

A heavy lump of ice block weighing about 10 Kgs which fell from the sky in the village of Hajibas² (Geographical Coordinates: 27°53'37"N 77°07'30"E), located at a distance of about two Kms from Pinangwan in the State of Haryana (India) on 18 May 2008.

The residents of Hajibas suddenly heard a big blowing sound and what people saw was a huge block of blue coloured ice weighing at least 10 Kilogram fallen from the sky, sinking into the ground and creating a crater about half a foot deep. Fortunately, there was no injury to any person or damage to any property. The ice block melted after about two to two and a half hours.

The above-mentioned case qualifies to be categorised under the term Non-Meteorological Ice. Now, the question

arises as to how to co-relate the above-mentioned incident of Haryana with that of blue ice of aircraft. The first evidence was the colour of Ice, which was Blue that was converted to bluish liquid on melting. Further, dry weather, summer season, no rains and isolated occurrence, ruled out any weather-related event. It so happened that the site of incident (Approximate Geographical Coordinates Latitude 27°53'37"N, Longitude 77°07'30"E.), is located in District Gurgaon (Haryana) at a distance of about 75 Kms (Aerial distance) from Indira Gandhi International (IGI) Airport, Delhi exactly towards the south (On a bearing of 180°). This place lies below the Air Traffic Services (ATS) route known as W-20N (Chennai-Bangalore-Hyderabad-Nagpur-Bhopal-Delhi).

And when over this place, the aircraft are approximately 15 to 20 minutes to land at IGI airport, where the commercial airliners are descending from their cruising level of about 30,000 feet down to 15,000 feet, where temperatures are comparatively higher than the cruising level. To retrace the sequence of events, the author of this paper flew on four to five occasions by the same route and verified the height of aircraft during descent through "In-Flight Entertainment System" over the same place. It tallied with the distance & height of the incident which was just apt for ice to fall down due melting. By combining all the facts and figures, the incident deserved the credit to get categorized as one of the rarest phenomena of blue aircraft ice falling on the ground in India.

Let us take another case also from India, which occurred on 08th March 2019 on Friday at 12'O Clock in Village Kuderadadar, Tehsil Chhura, District Raipur, (Chhattisgarh). While people were working in their fields, suddenly two chunks of Ice weighing about half a Kilo each fell there. It was hot Sun and there were no rains or clouds. Pukesh Dhru, the son of farmer Keju Ram and his labourer found the chunks as cold as ice with many holes there. Ice chunks had a foul smell. After some time, the pieces melted to water.

The case was analysed by the author. It was found that as the Ice chunks had a foul smell, it showed that the ice was definitely of non-meteorological origin. Further, the incident site (27°57'47.16"N, 76°14'45.34"E) lies on ATS Route (Air Traffic Services Route) W13S/ A474S at a distance of 208 kms East (on a bearing of 240°) of IGI Airport, Delhi, where the aircraft coming to Delhi from South West side are in their descent phase.

One more case occurred on 0915 Hrs 19.02.2011 on Sat Day when a Smelly³ Ice lump of green Colour weighing about 6 Kgs fell in CRPF Camp in Suthyana (Geographical Coordinate 28°31'02"N, 77°27'11"E) in Greater Noida (U.P.).

It was an obvious case of fall of ice from aircraft as the colour of ice lump was 'Green'. It was further observed that the incident site was located in the approach path to IGI Airport at a distance of about 40 Kms, where the aircraft are descending to land. However, to confirm the same, the sample was tested in a Government Laboratory, 'Central Soil and Materials Research Station, Olof Palme Marg, Sector 3, Hauz Khas, New Delhi, 110016, which gave the following conclusion⁴



'Based on physical and chemical examination of the sample of blue ice, it appears to be frozen bio-waste mixed with commonly used blue coloured liquid disinfectant material.'

This confirmed the origin of the ice as from the aircraft.

4. Common Myths Prevalent in Respect of Aircraft Ice:

There are certain common myths which are generally prevalent among us, which are however not true. Some such myths are mentioned here.

Myth No. 1- The ice from the aircraft Toilets is always Blue or Green:

One most common myth is that the colour of ice leaking out from aircraft toilets is always Blue or green. That is why whenever any case of ice fall from the sky is reported, many people start making their assessment that since the colour of the ice was not Blue, hence it could not be from the aircraft.

Unfortunately, the above is not true in the present-day scenario. The colour of ice from the aircraft may be anything. Nowadays in most of the cases, it is white (or yellowish. Sometimes it could be brownish, rusty or muddy. So, let us see how the colour of the ice lump may differ from case to case.

Blue/ Green and Greenish-Blue Coloured Chunks:



The earlier generation aeroplanes *say till the early 1980's* had toilet bowls mounted on top of self-contained toilet waste tanks. These toilet tanks were serviced with a chemical fluid that was mixed with a blue or green dye, and deodorant, and were serviced from toilet service panels. The same fluid was used right through the flight each time the flush handle in the toilet was operated. The blue ice problem could be linked to leakage of the drain valve at the bottom of these toilet waste tanks as well as leakage of the drain valve at the toilet service panel, which always could be blue, greenish-blue or Green. On such aeroplanes, one could see blue stains on the sides of the fuselage close to the toilet servicing stations. In other words, before mid-eighties, any ice chunk from an aircraft invariably used to be Blue. And that was the origin of the word "blue ice" which has been in use even till today. In case the quantity of the urine in the flush tank was more, the colour of ice used to become green or greenish on mixing with blue disinfectant. was or greenish.

It is also worth mentioning, that even in modern-day aircraft, sometimes still they do use blue coloured sanitizer liquid, though occasionally. Thus, in such cases, the leakage maybe blue.

For example, on 15 June 2013, the author flew on an ATR-72 aircraft, where the Blue sanitizing liquid was used in the toilet bowls. Hypothetically, leakage from the defective toilet lines of this aircraft will be Blue, as shown below:

White or dirty white coloured ice Chunks:

However, the situation changed after mid-eighties, when the present generation aeroplanes adopted a new technology known as Vacuum Toilet System. In this system, the toilet bowls of various toilets are connected through flush lines to toilet waste tanks that are remotely located (usually in cargo compartments). In these, a very

small quantity of water from the potable water tanks is supplied to each toilet through separate lines for flushing. These aircraft normally don't use Blue deodorant or use them sporadically.

Thus, the colour of ice from the leakage of toilets of present-day aircraft is mostly White. This is also evident visually to any passenger, who uses the toilets in present-day aircraft and finds that the colour, the liquid in the toilet bowl is normally white.

This is the toilet from a B787 aircraft on which the author flew on 2nd May 2019, showing that the water as transparent. Hypothetically, the leakage from the defective toilet lines of this aircraft will be of white or transparent colour

The water leakage from such toilets would be of watercolour or Colourless ((transparent). If the exterior part of the aircraft where the leaking toilet lies are exiting is unclean, the colour of ice may be dirty white. And that is the reason that nowadays the colour of the ice blocks falling from the sky are found to be of white or dirty white.

Yellowish/ Brown Coloured ice Blocks:

Sometimes the ice blocks have fallen from the sky are found of a yellow or brownish colour. Such colour mostly comes due to presence of concentrated and proportionately large quantity urine (or extra presence of faecal matter) which provides light or dark yellowish tint or a muddy colour to the ice chunks formed due to leakage. In such cases, the colour of leaked fluid may turn it to Yellow, Yellowish or brownish or rusty.

Moreover, on certain aeroplanes whenever there is a regular leakage from toilet lines, aircraft engineers on the ground observe brownish streaks (Or rusty coloured) from where the vacuum line from the toilet waste tank exhausts overboard. Thus, ice formed on such aircraft due to leakage of fluid may show brownish or rusty colour.

Myth No. 2- Any block of ice falling from the sky is a Megacryometeor:

One of the biggest misunderstandings occurs between the two terms Megacryometeor³ and the Ice from aircraft, where a large number of people presume the two objects as the same. Many times the news in media would address the event as a fall of Megacryometeor from an aircraft. So much so that even some of the research papers have been observed mentioning that "A blue coloured Megacryometeor had fallen from the sky"

On the contrary, a Megacryometeor and a block of aircraft ice are two entirely different objects. While a Megacryometeor is a purely weather-related or a meteorological event, the aircraft ice is a block of ice formed from leaking toilet drains.

As per the phenomenon of abnormally large chunks of ice falling from a clear, the sky under the abnormal circumstances are known as Megacryometeors, a term coined by Jesus Martinez-Frias, a planetary geologist at the Centre for Astrobiology in Madrid, Spain who pioneered research into Megacryometeors in January 200.

As per Mr Jesus Martinez-Frias, a planetary geologist at the Centre for Astrobiology in Madrid, Spain, who pioneered research in January 2000 and coined the term 'Megacryometeors';

"the Megacryometeors are transparent, odourless and their analysis show that their composition matches normal rainwater for the areas in which they fell, thereby categorising them as weather-related. Fall of a megacryometeor is a rare event.

On the other hand, the "Ice from passenger aircraft" is a non-meteorological object unrelated to natural weather. The incidents of fall of "Ice from passenger aircraft" is a common and frequently occurring event, which can be termed as the ice made from the frozen toilet waste or a frozen mix of urine, faeces and water, formed as a result of leakage from defective drain lines from aircraft. While the colour of aircraft ice could be blue, green, white, yellow, pale, brown, rusty or any other colour, the colour of the Megacryometeor is normally always be white or transparent (Being a case of pure Frozen water). A block of fallen aircraft ice could be sticky or gelatinous (viscous) with the smell of disinfectant, a Megacryometeor may be odourless and non-sticky.

It is also worth mentioning that there are very few incidents where the solid evidence of the presence of a Megacryometeor has been confirmed after a laboratory test.

. It is also worth noting that if suitable efforts are made, the aircraft ice formation can be prevented, but not that of formation of a megacryometeor.

Myth No. 3- No aircraft was seen in the sky, that shows the ice was not from an aircraft:

It is often heard from the eyewitnesses that they had not seen any aircraft in the sky at the time of fall of ice, hence the fallen piece of ice could not be from an aircraft. However, the facts could be contrary to the above. The above could, however, be a misapprehension and may not be true in all circumstances.

An aircraft involved in such incident may not always necessarily be seen by the eyewitnesses. The reason is that a cruising aircraft flying at a height of about 10 Kms above ground would itself look too small in size. Further, the falling ice block would take about 45 Seconds to fall on the ground. Even an aircraft speed during approach phase (Before landing) is also quite high with speed ranging from

500-600 Kilometers per hour and height about 10,000-15,000 ft.

Time taken for the ice block to come down to the ground can be calculated by the formula;

$$t = \sqrt{2D/g}, \text{ where } t = \text{time of fall, } D = \text{height of aircraft and } g = \text{acceleration due to gravity}$$
$$g = 9.81 \text{ m/s}^2 \text{ (meters per second squared).}$$

Thus, it may take about 45 seconds to fall from a cruising aircraft at an altitude of about 10 Kms. And about 30 seconds to fall from a descending aircraft at a height of about 4500 Meters.

During this period a passenger jet flying at a speed of about 900 Kms /hr (Or 15 Kms per minute) would travel a horizontal distance of about 11 Kms during the cruise, and about 7 kms during descent. Thus, by the time the eye witness realizes that something has fallen and looks up over the sky, he may not find any aircraft there.

A photograph shows the actual height & speed of aircraft during descent, 11 Minutes before landing;

Myth No. 4- Ice from aircraft would melt during fall and would not appear on reaching ground:

Many times, people believe that even if an ice block falls from an aircraft, it would melt away by the time reached ground. This is however not always correct. While the thin sheets of ice formed on the wings, and other parts of the fuselage may melt during fall, the immense leakage from toilet sumps may remain solidified even till the time it reaches the ground.

The main reason is that the atmospheric temperature falls at the rate of about 6.5°C per Kms as we go up. Thus, the outside temperature may remain below the freezing point until the lump of ice falls to less than 15000 ft or so. It may just take about 30 seconds till the ice gets dropped on the ground.

The ice from a leaking toilet drain may be as heavy as from a few grams to 100s of Kilograms depending upon the kind of leakage (Whether light or heavy), duration of the flight (Longer for cruising aircraft, particularly an aircraft on an International flight which sometimes may last from 8 to 10 hours or even more), Capacity of Toilet tanks- higher is the capacity larger is the volume & weight of the ice formed. To give an example, the toilet drains tank capacity of a B737 maybe around 110 Litres. Imagine a case if all the toilet liquid leaks out and gets frozen, the weight of ice formed would be 110 Kgs. The capacity of the drain sumps of a B757 is 1000 Litres, and that of an Airbus-380 is about 3000 litres (the main sump of the A-380 aircraft itself has the capacity of 675Litres).

It is therefore evident that the falling chunk of ice may not always meltdown during fall. There have been occasions when heavy ice block had fallen from the sky. Fall of an ice block weighing as much as 30 to 40 Kgs are quite common. After the fall, such ice blocks get broken into pieces after fall. If they fall on a roof, the roof would get damaged, and if they fall on a vehicle, it could get crushed. Think of a case, when such a heavy ice block falls on some person, or to say on a crowded area. We can only guess the volume of tragedy and implications thereafter.

Occasionally the aircraft ice takes real serious shape. For instance, in Istria (Croatia) on 22 Sept 2012, a huge chunk of ice weighing about 300 to 500 kg with a size about ½ M X 1 M X 1 M fell from the sky scaring the people just 10 Meters away.

Similarly, in India on 19 Aug 2010 at Jashpur (Jharkhand) (Geo-Coordinates 22°50'33"N 83°49'30"E) 100 Kgs heavy ice lump fell. The place lies on Kolkata-Karachi route where International aircraft cruise at high altitude.

Myth No. 5- The ice block from aircraft is a solidified piece of faeces:

It is also believed in many circles that the fallen ice from aircraft toilets is nothing but the frozen block of solid poo. The same is, however, 'not' entirely correct. As had already stated earlier, the solid waste material from aircraft toilets gets deposited, into the toilet drain sump along with the flushed water. Thus, the contents of the drain sump, is nothing but a mixture of water, sanitizing chemicals, urine, faeces and other materials like toilet paper and sometimes another kind of undesirable waste. Majority of the same is of course water.

Thus, whenever there is a leakage from the faulty drain lines, the liquid coming out would be a combination of Water, sanitizing liquid, urine along with a mixture of traces of faeces, but 'not the solid poop'. When the above liquid gets solidified into an ice block, the above ice block would mainly consist of water, urine and other soluble items with particles of faeces. This ice when melted may be smelly, viscous, and sticky. However, it is not to be termed as a solidified human excreta.

5. Conclusion:

Reports of cases of ice fall from the sky even when the weather is dry, keep on appearing in Newspapers, TV, and other media channels from all over the world, which in turn create a lot of confusion, commotion and panic in the surroundings. The size, shape, colour, weight and nature of ice varies considerably on case to case basis from small to very large, from pure white or transparent to yellow, brownish, blue, green, yellow, ash-coloured or rusty.

There are many myths associated with the blocks of ice fallen from the sky. The very first myth is that if the ice has fallen from the aircraft toilets, it must invariably be Blue or Green, which unfortunately is not true. It could be of any other colour.

Another very common Myth is that any block of ice falling from the sky is a Megacryometeor. This is however totally untrue. While the ice from aircraft is a non-meteorological event since such ice gets created from the defective pipelines of aircraft toilets; on the other hand, a Megacryometeor is a purely meteorological event, which is formed under unusual atmospheric conditions.

Another myth prevalent is that as no aircraft were seen in the sky after the ice fall, which shows the ice was not from an aircraft. This reason is not valid, since, by the time the eyewitness looks at the sky, aircraft may fly to as much as 6 to 10 Kilometres away.

Many people believe that the Ice from aircraft would melt during fall and would not appear on reaching the ground. This is however not always correct. The ice from a leaking toilet drain may be as heavy as from a few grams to 100s of Kilograms depending upon the kind of leakage or even more. The large-sized ice blocks may not melt fully on falling on the ground.

On account of the above myths, many times, the investigation of such incidents take an altogether different route, thereby resulting in losing a lot of valuable time for investigation.

Bimal K. Srivastava,

REFERENCES:

1. Martinez-Frias, Jesus; Delgado Huertas, Antonio (2006). "Megacryometeors: Distribution on Earth and Current Research". *AMBIO: A Journal of the Human Environment* 35 (6): 314. doi:10.1579/06-S-187.1.)
2. 'When Blue Ice Falls from the Sky' by Srivastava, Bimal K. published in *Science Reporter*, SR Vol.48(07) [July 2011], available online. Link <http://nopr.niscair.res.in/handle/123456789/12156>.
3. 'Case Study of Incidents of fall of Non-Meteorological Ice from Sky Reported through Indian News Media' by Bimal K. Srivastava, *Journal of Environment Protection and Sustainable Development*, Vol. 1, No. 2, 2015, pp. 29-53, <http://www.publicscienceframework.org/journal/jepsd>
4. 'Falling Ice Blocks from Sky - A Case Study' by *Sharma, Pankaj, Kachhal P.I., Vyas Sameer, Kaushal Manorma, Mahure N.V., Sivakumar N. published in 'Journal of Research, in Chemistry and Environment' Vol. 2 Issue 1 January. 2012(310-313)-ISSN 2248-9649, Central Soil and Materials, Research Station,

New Delhi, INDIA (Appended)

General References:

5. Incidents of Fall of Ice from Sky, 523.4: 551.574.1, MAUSAM, 69, 3; India Meteorological Department Publication July 2018, Page 477-478
6. 'Cases of Fall of Blue Aircraft Ice from Sky In India' by Bimal K. Srivastava, published in 'Journal of Aerospace Sciences and Technologies' [Aeronautical Society of India], May 2011 issue (Volume 63, Number 2)-ISSN 0972-950x".

BIOGRAPHY



The author, Bimal Kumar Srivastava is a B.Tech. Degree Holder from IIT Kanpur in Electrical Engineering passed out in the year 1968, and also holds equivalent degrees in Aeronautical Engineering with Aircraft Navigation & Operations Group, and with Avionics Group from the Aeronautical Society of India.

Mr Srivastava commenced his career at as Assistant Aerodrome Officer at Mumbai Airport with Director General of Civil Aviation in 1970 and finally retired in the year 2006 from Airports Authority of India (AAI), New Delhi as General Manager. He then set up his own company "Aero Survey" in New Delhi working as an independent Aviation Consultant & Director.

Mr Srivastava has the experience of working in various fields of Aviation including Air Traffic Controls, Airport Management, Airport Obstacle Survey (OLS Survey), Aircraft Accident Investigation, Aircraft Engineering, Airport Management and in other miscellaneous fields related to aviation. He had also worked as Airport Director In-charge of Hyderabad International Airport, Guwahati International Airport and at Pune Airport.

While functioning as Air Safety Officer at Mumbai Airport, he was handling the matter pertaining to Air Safety and the Accident & Incident Investigation of aircraft. He was closely associated with investigation of a number of cases of major & minor aircraft accidents of commercial airliner.

Mr. Srivastava has written a number of books mainly on the topic of aviation in Hindi & English. Most of his books in Hindi were honoured with several awards from Government of India (From Ministry of Civil Aviation, Ministry of Science & Technology, Ministry of Tourism, and from Ministry of Home affairs. He was also awarded "Indira Gandhi Rajbhasha Awards by the President of India. He has also published a number of Technical Papers in various Technical Journals. His name also appears in the Limca Book of Records for simultaneous publication of four of his articles on four different topics of Science on the cover pages of four different Science Magazines in Hindi & English in Sept 2006. It may be mentioned that 'Limca Book of Records' is an annual reference book published in India documenting world records, categorised in education, literature, agriculture, medical science, business, etc. His articles on the topics of Aviation, Science, Tourism and on General subjects have been published by more than 1000 Hindi & English Newspapers & Magazines.

Mr. B.K. Srivastava is presently working as an Aviation Consultant and the Director, in Aero Survey Pvt Ltd, in New Delhi providing technical consultancy in the field of Aviation pertaining to Airports & Helipads as well as in the field of Obstacle Survey of Airports.